Data Management & Analytics
The Data Layer

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For the Objective of Operations Support

- **Improved Decision Making**
  - Real Time
    - Current Minute
    - Current Hour
  - Enhanced Predictability
    - Next Minute
    - Next Market Cycle
    - Next Hour
    - Next Day
- **Leading to Automated Control**
  - Sub-second response

Phasor Data Lessons Learned

- **There are scaling issues**
  - Communication network
  - Protocols
  - Data storage
  - Providing low latency data to applications
- **Data quality requirements exceed current standards**

Some Candidate10-Year Assumptions

- **Process**
  - A governance model at least as complex and as tightly regulated as the current NERC Functional Model must be supported
  - The number of entities influencing grid reliability in the US will increase – but no more than double
  - Data streams to support real-time analytics will increase significantly – for many operating entities, two orders of magnitude
  - Data accuracy and quality requirements will increase
  - A “fully analyzed” system will require new analytics and tools

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Some Candidate10-Year Assumptions

- **Technology**
  - Convergence of IT and control technology will continue to dominate improvements in SCADA and power controls and protection
  - Storage costs will continue to decrease
  - Computation costs will continue to decrease
  - Large Memory HPC will become affordable to large grid operators
  - Systems for operations and control will merge with “systems of record”
  - Additional cloud-based services will support grid operations

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The Next Generation Phasor Data Layer

- Accessible architecture
- Extensible support for multiple input protocols
- Pub/Sub at high data transfer rates with a library of native language APIs
- Data labeling flexibility
- Fast data archival
- Very-fast data server – historical and RT
- Data quality alarming
- On-the-fly data reduction
- Lossless data compression

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Open Source Success Factors

- **Resources for start-up**
- **Good technology – High quality code**
- **A commercial friendly license model**
- **Strategy for building a sustained community**
  - Governance structure
  - Community support – code hosting, problem resolution
  - Promotion

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Building an open source community

- Success is measured by the quantity and quality of contribution and participation
- Strongest communities have objectives that are aligned
- Good news – culture of collaboration already exists within the electric utility industry
- Not so good news – clashes with the research culture of IP management and “not invented here”

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Some Data Layer Challenges

- **Trajectory to integrate the requirements of two domains**
  - High-speed processing of high-volume streaming data
  - Larger models with very large supporting data requirement requiring HPC to meet business requirements
- **Launch requirement to accommodate “n” configuration name spaces**
- **Creating a extensible interface to the data layer where effort to implement matches value**

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